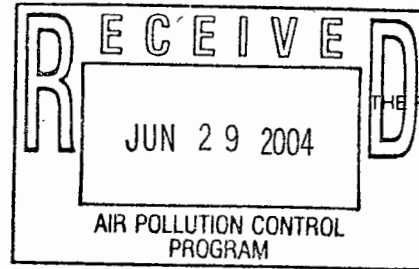




## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII  
901 NORTH 5TH STREET  
KANSAS CITY, KANSAS 66101

Mr. Stephen Mahfood  
Director  
Department of Natural Resources  
P. O. Box 176  
Jefferson City, Missouri 65102



OFFICE OF  
THE REGIONAL ADMINISTRATOR

Dear Mr. Mahfood:

Fine-particle pollution represents one of the most significant barriers to clean air facing our nation today. These tiny particles – about 1/30<sup>th</sup> the diameter of a human hair – have been scientifically linked to serious human health problems. Their ability to be suspended in air for long periods of time makes them a public health threat far beyond the source of emissions. An important part of our nation's commitment to clean, healthy air deals with reducing levels of this fine particle or PM<sub>2.5</sub> pollution.

In March, your State submitted its recommended boundaries for PM<sub>2.5</sub> attainment and nonattainment areas. We have thoroughly reviewed your recommendations and the technical information you have submitted to support your recommendations. We appreciate the effort your State has made to develop this supporting information. Consistent with the Clean Air Act, this letter is to notify you that based on the information contained in your submittal, EPA agrees with your recommended designations and boundaries.

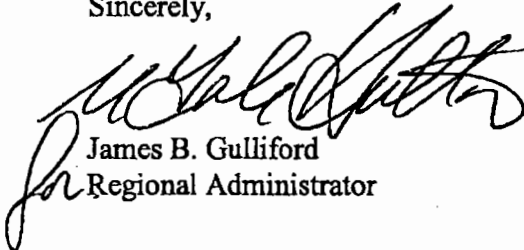
Attached to this letter is a detailed enclosure containing tables and a map in which EPA identifies the counties that should be included in the St. Louis nonattainment area as well as an evaluation of the 9 factors.

You will hear from us again in November when EPA takes the final step in the PM<sub>2.5</sub> designation process and determines those areas that are in attainment and meet the fine particle standards and those areas that do not meet them. For areas in attainment, the challenge will be not only to maintain, but also to continue the progress you have made toward clean air. It is a commitment to no backsliding in your State's clean air status for fine particles. For areas across the country like St. Louis, EPA will also issue a proposed fine particle implementation rule prior to final designations, which will allow states to proceed with planning to achieve clean air.

The Bush Administration is addressing fine particle pollution with a comprehensive national clean air strategy. This strategy includes EPA's recent rule to reduce pollution from nonroad diesel engines, and the proposed rule to reduce pollution from power plants in the eastern U.S. These two rules are important components of EPA's efforts to help States and localities meet the more protective national fine-particle and 8-hour ozone air quality standards. Together these rules will help all areas of the country achieve cleaner air.

We look forward to a continued dialogue with Missouri as we work to finalize the designations for the PM2.5 standard. If you have any questions, please do not hesitate to call me at (913) 551-7006 or contact Art Spratlin of my staff, who may be reached at (913) 551-7401.

Sincerely,



James B. Gulliford  
Regional Administrator

Enclosure

cc: Mrs. Leanne Tippet-Mosby, Director  
Missouri Department of Natural Resources

## Attachment 1

RECOMMENDATIONS

MO-IL CMSA Area	EPA Recommendation	State Recommendation
Missouri	Nonattaining full counties: Franklin Jefferson St. Charles St. Louis St. Louis City	Nonattaining full counties: Franklin Jefferson St. Charles St. Louis St. Louis City

In Missouri the MO-IL St. Louis CMSA counties include Franklin, Jefferson, Lincoln, St. Charles, St. Louis, St. Louis City, and Warren counties.

ANALYSIS

The following is a brief summary of the 9-factor analysis for the Missouri portion of the MO-IL St. Louis CMSA. Missouri counties that are in the CMSA are in **bold**; other counties are adjacent to the CMSA counties.

Factor 1: Emissions

For this factor, EPA Region 7 looked at primary PM-2.5, SO<sub>2</sub>, NO<sub>x</sub>, carbon, and crustal PM-2.5 emissions. An emissions score (ES) was developed for each county to serve as an indicator of the local PM-2.5 contribution for the CSMA. The ES was derived as follows:

$$\begin{aligned}
 \text{ES} = & [(\text{county SO}_2 \text{ tons/ CMSA SO}_2 \text{ tons}) * (\% \text{ sulfate of urban excess PM-2.5})] \\
 & + [(\text{county NO}_x \text{ tons/ CMSA NO}_x \text{ tons}) * (\% \text{ nitrate of urban excess PM-2.5})] \\
 & + [(\text{county carbon tons/ CMSA carbon tons}) * (\% \text{ carbon of urban excess PM-2.5})] \\
 & + [(\text{county crustal PM tons/ CMSA crustal PM tons}) * (\% \text{ crustal of urban excess PM-2.5})]
 \end{aligned}$$

ES incorporated an urban excess factor to evaluate the local-scale contribution for the pollutants listed below. This excess factor (local-scale contribution) was determined by comparing speciated pollutant measurements between the St. Louis (urban) monitor at Blair Street with the rural monitor at Mingo located in Stoddard County approximately 120 miles SSE of St. Louis. The local-scale contribution for each pollutant category is as follows;

Urban Excess (mass) – 6.2 ug/m<sup>3</sup>

❖ Nitrates – (29%)

- ❖ Sulfates – (8%)
- ❖ Total Carbon Mass – (58%)
- ❖ Crustal Material – (5%)

By evaluating the speciation data between these two monitoring sites, one is able to differentiate between regional and local source influences. Regional influences are seen predominately in the summertime with sulfate sources (power plants), while during the fall and winter seasons, higher levels of total carbon and nitrates are seen from local sources.

The Emissions Score for all 12 counties (Missouri and Illinois) within MO-IL CMSA add to 100. Counties adjacent to the CMSA are also calculated an ES so that emissions from those counties can be compared to the CMSA counties.

The following table shows total emissions (in tons/year) and ES values for Missouri counties that are included in the MO-IL St. Louis CSMA and for those that are adjacent to the CMSA. (Data source: 2001 National Emissions Inventory (NEI))

County	direct PM-2.5 (tons/yr)	SO <sub>2</sub> (tons/yr)	NO <sub>x</sub> (tons/yr)	Carbon PM-2.5 (tons/yr)	Crustal/ other direct PM-2.5 (tons/yr)	ES	Cum ES
St. Louis, MO	6,689	30,400	53,358	3,456	2,897	27.4	27.4
St. Louis City, MO	2,424	14,647	27,193	1,214	958	11.0	55.2
Jefferson, MO	4,870	52,671	13,612	1,160	3,291	10.4	65.6
St. Charles, MO	3,424	40,596	25,793	896	2,415	10.2	75.8
Franklin, MO	4,066	45,216	15,482	918	2,864	9.1	84.9
Lincoln, MO	1,650	221	2,935	273	1,358	2.1	93.8
Warren, MO	889	324	1,803	205	674	1.5	98.9
Crawford, MO	590	110	2,199	183	396	1.4	
Gasconade, MO	533	248	1,727	132	393	1.0	
Montgomery, MO	879	364	1,740	145	719	1.2	
Pike, MO	1,156	15,205	10,931	206	773	3.3	
St. Francois, MO	1,212	697	4,204	328	825	2.5	
* Ste. Genevieve, MO	1,308	9,205	18,027	255	940	2.7 to 4.2	
Washington, MO	467	152	1,161	137	322	1.0	

\* – Emissions in Ste. Genevieve County were adjusted to account for industrial growth from new permits and PSD applications received by the state of Missouri. This growth resulted in the CES value changing from 2.7 to 4.2.

A natural break was observed for Missouri counties with an ES score of 9.1 and above. In the case of the MO-IL, the natural break CMSA county is Franklin Co, MO (ES Score = 9.1). Applied to Missouri, this process identifies St. Louis, St. Louis City, Jefferson, St. Charles, and Franklin counties in MO as candidates for a PM-2.5 nonattainment designation (i.e., counties with ES values  $\geq 9.1$ ), and, therefore, requiring further analysis of the remaining factors is required (see below).

Crawford, Gasconade, Montgomery, Pike, St Francois, Ste. Genevieve, and Washington counties in Missouri are dropped from further analysis because (1) none of these counties contain violating PM-2.5 monitors, (2) none were recommended for a nonattainment designation by the state, and (3) all have ES values significantly below  $<9.1$ . The next closest county is Ste. Genevieve with an ES value of 4.2 based upon projected emissions from industrial growth. NO<sub>x</sub> emissions increased for St. Genevieve from industrial growth by 12,000 tons/year, while SO<sub>x</sub> emissions increased by 4,000 tons/year.

### **Factor 2: Air quality**

County	2001-2003 design value (PM-2.5 in $\mu\text{g}/\text{m}^3$ )
<b>St. Louis City, MO</b>	<b>15.2</b>
<b>Jefferson, MO</b>	<b>14.5</b>
<b>St. Charles, MO</b>	<b>14.3</b>
<b>St. Louis, MO</b>	<b>14.0</b>

Based on the analysis for this factor, only one county, St. Louis City, shows a violation of the annual PM-2.5 standard. The violating area (St. Louis City) must have a nonattainment designation. However, this factor alone is not sufficient to eliminate the other counties as candidates for nonattainment status.

### **Factor 3: Population Density and Urbanization**

County	2002 Population (people)	2002 Pop Density (pop/sq mi)
<b>St. Louis, MO</b>	<b>1,018,102</b>	<b>2,004</b>
<b>St. Louis City, MO</b>	<b>338,353</b>	<b>5,457</b>
<b>St. Charles, MO</b>	<b>303,030</b>	<b>540</b>
<b>Jefferson, MO</b>	<b>203,993</b>	<b>310</b>
<b>Franklin, MO</b>	<b>95,890</b>	<b>104</b>

Factors 3-5 correlate very well with mobile source emissions, population and commuting activities. An evaluation of these factors and Vehicles Miles Traveled (VMT) data support the county emission scores in Factor 1. The national approach of utilizing emission scores outlined in Factor 1 supported the recommendations made by the state.

**Factor 4: Traffic and commuting patterns**

County	VMT <sup>1</sup> (1000 miles)	VMT Growth <sup>2</sup> (1000 miles)	VMT % Change <sup>3</sup>
St. Louis, MO	11,553	3,280	24
St. Louis City, MO	4,178	1,719	41
St. Charles, MO	2,738	577	21
Jefferson, MO	2,511	322	13
Franklin	1,391	- 263	-19

<sup>1</sup> Vehicle Miles Traveled within county in 2002<sup>2</sup> 2002 to 2010<sup>3</sup> 2002 to 2010 (as percentage of 2002 population)**Factor 5: Expected growth**

County	2002 Population (people)	Population Growth <sup>1</sup> (people)	% Change <sup>2</sup>
St. Louis, MO	1,018,102	22,786	2
St. Louis City, MO	338,353	- 48,496	- 12
St. Charles, MO	303,030	70,976	33
Jefferson, MO	203,993	26,719	16
Franklin, MO	95,890	104	16

<sup>1</sup> 2002 to 2010<sup>2</sup> Estimated change in population growth, 2002 to 2010 (as a percentage of 2002 population)

Factors 6-9 did not significantly influence the designation process.

**Factor 6: Meteorology**

An evaluation conducted by Region 7 included trajectory cluster analysis using sulfate, nitrate, and organic carbon PM<sub>2.5</sub> speciation measurements for the Blair Street site in St. Louis. This analysis generates back trajectories from the HYSPLIT model to characterize meteorological events for 8 specific clusters. High nitrate events occurred from trajectories originating from the North – Northwest, which agrees with the atmospheric chemistry for nitrate formation that occurs during fall/winter cooling periods. High sulfate events occurred during the summer with trajectories occurring from the Ohio River Valley or upper Mississippi River Valley.

**Factor 7: Geography/topography**

The Missouri counties of the St. Louis MO-IL CSMA counties do not have any geographical or topographical boundaries limiting transport across this airshed. The only observation noted in our review was the noticeable gradient of PM<sub>2.5</sub> measurements as you go from east to west possibly indicating a more significant source of PM<sub>2.5</sub> sources from the East or Illinois side of the River. The critical monitor is located in Madison County, Illinois with a 2001-2003 design value of 17.5 ug/m<sup>3</sup>. As you move from East to West, the ambient levels drop to 14 ug/m<sup>3</sup>.

**Factor 8: Jurisdictional boundaries**

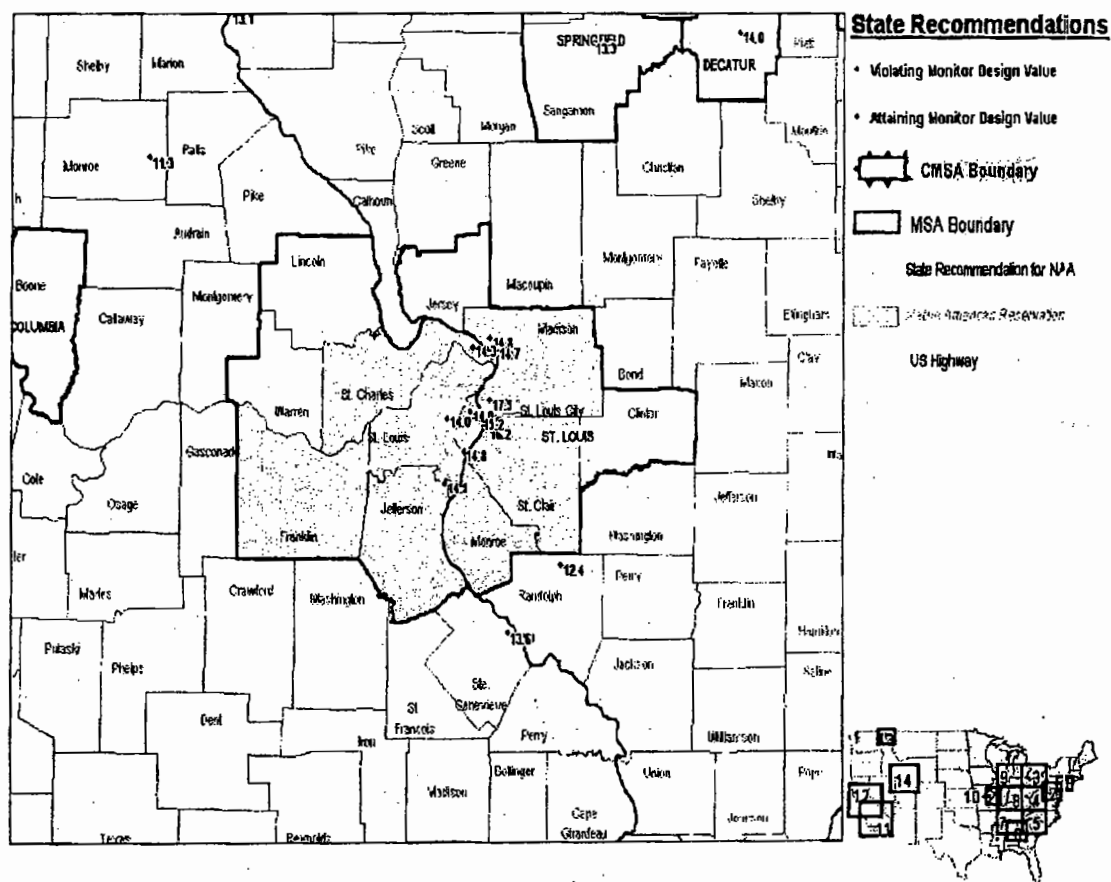
Jurisdictional boundaries did not play a role in determining nonattainment boundaries. Areas designated as 8-hour ozone nonattainment areas are also important boundaries for state air-quality planning. Franklin, Jefferson, St. Charles, St. Louis, and St. Louis City were included in the nonattainment area associated with the St. Louis 8 hour ozone nonattainment area. A goal in designating PM-2.5 nonattainment areas is to achieve a degree of consistency with ozone NA areas. Comparison of ozone areas with potential PM-2.5 NA areas, therefore, gives added weight to designation of the above counties.

**Factor 9: Level of control of emission sources**

A review of all the factors as well as the recommendations and supporting documentation from the state of Missouri did not identify any additional counties that should be excluded or included in the St. Louis PM<sub>2.5</sub> nonattainment area. Based upon this review and the methodology established by the PM<sub>2.5</sub> Review Team consisting of members from Regions 1-5 and 7-9 as well as representatives from the Office of Air Quality Planning and Standards, the following Missouri counties are recommended for nonattainment for PM<sub>2.5</sub> for the St. Louis Metropolitan Area:

- ❖ St. Louis
- ❖ St. Louis City
- ❖ St. Charles
- ❖ Jefferson
- ❖ Franklin





## Attachment 2

**An Explanation of EPA's 9-Factor Analysis**

EPA reviewed the 9 factors for the counties within the metropolitan area as well as the 7 counties adjacent to the metropolitan area in order to determine the appropriate nonattainment area. There are 7 Missouri counties in this metropolitan area, Jefferson, Franklin, Lincoln, St. Charles, St. Louis, St. Louis City, and Warren. This review will not cover counties located in Illinois that make-up the 2003 CSMA for St. Louis.

Adjacent counties to the CMSA include Crawford, Gasconade, Montgomery, Pike, St Francois, Ste. Genevieve, and Washington counties in MO. The only Missouri county in this CMSA and adjacent counties that contains a monitor that violated the annual PM-2.5 standard (based on 2001-2003 data) is located in St. Louis City. However, the absence of a violating monitor does not automatically disqualify a county from a PM-2.5 nonattainment designation.

MDNR recommended the following counties be designated as nonattainment; Franklin, Jefferson, St. Charles, St. Louis, and St. Louis City. EPA Region 7's 9-factor analysis agrees with the state's recommendation with no modifications being proposed.

**Factor 1. Emissions in areas potentially included versus excluded from the nonattainment area:**

*The analysis for factor 1 looks at emissions of carbonaceous particles ("carbon"), inorganic particles ("crustal"), SO<sub>2</sub>, and NO<sub>x</sub>. EPA computed a composite emission score for each county by multiplying the county's emissions as a fraction of the metropolitan area emissions for each of these pollutants times a corresponding air quality weighting factor. The air quality weighting factors for each area are given below and reflect the percentages of the total estimated "urban excess" value found as, respectively, carbonaceous particles, miscellaneous inorganic particles ("crustal material"), ammonium sulfate, and ammonium nitrate. These scores add to 100 for the metropolitan area counties. Composite scores were also calculated for counties adjacent to the metropolitan area. Tables presented under factor 1 present the emissions of carbonaceous particles, inorganic particles, SO<sub>2</sub>, and NO<sub>x</sub> and the composite emission scores for the counties in the corresponding metropolitan area and adjacent counties. Metropolitan area counties are in bold. Emissions data indicate the potential for a county to contribute to observed violations, often making the emissions data the most important factor in assessing boundaries of nonattainment areas.*

*"Urban excess" values are derived by comparing urban monitored component concentrations against rural monitored component concentrations. Concentrations of the four PM<sub>2.5</sub> components are obtained from local data if available (or, if necessary, from the nearest available urban site), and are compared to available rural concentrations. The monitoring sites used for this purpose are identified below.*

*Although this information is air quality information, it is presented under Factor 1 due to its integration into the analysis of emissions information.*

**Factor 2. Air quality in potentially included versus excluded areas:**

*The air quality analysis looks at the annual averaged design value for each area based on data for 2001 to 2003. Counties without monitors are not listed.*

**Factor 3. Population density and degree of urbanization including commercial development in included versus excluded areas:**

*Tables presented under factor 3 show the 2003 population for each metropolitan area, as well as the population density for each county in that area. Population data indicate the likelihood of population-based emissions that might contribute to violations.*

**Factor 4. Traffic and commuting patterns:**

*The traffic and commuting analysis looks at the number of commuters in each county who drive to another county within the metropolitan area ("Number"), the percent of total commuters in each county who commute to other counties within the metropolitan area ("percent")\*, as well as the total Vehicle Miles Traveled (VMT) for each county in thousands of miles. A county with numerous commuters is generally an integral part of the area, and would be an appropriate part of the domain of some mobile source strategies, thus warranting inclusion in the nonattainment area.*

*\*Note that the percent of commuters traveling to counties within the metropolitan area is based on the total number of commuters from that county. This total includes commuters who may travel outside the metropolitan area from their county of origin.*

**Factor 5. Expected growth:**

*The expected growth analysis looks at the percent growth for counties in each metropolitan area from 1990 to 2000.*

**Factor 6. Meteorology:**

*The meteorology analysis looks at wind data gathered over a ten year period by the National Weather Service. Tables presented under factor 6 list the year round average prevailing wind directions by quadrant for each county in the corresponding metropolitan area. These data show that annual average PM<sub>2.5</sub> concentrations are influenced by emissions in any direction at various times, but these data may also suggest that emissions in some directions relative to the violation may be more prone to contribute than emissions in other directions.*

**Factor 7. Geography/topography:**

*The geography/topography analysis looks at physical features of the land that might have an effect on the airshed, and therefore, the distribution of particulate matter over an area. The State of Ohio has no such features that significantly influenced EPA's recommended nonattainment areas.*

**Factor 8. Jurisdictional boundaries:**

*The analysis of jurisdictional boundaries looks at the planning and organizational structure of an area to determine if the implementation of controls in a potential nonattainment area can be carried out in a cohesive manner.*

**Factor 9. Level of control of emission sources:**

*The level of control analysis looks at what controls are currently implemented in each area.*

The following is a 9-factor analysis for Missouri counties that are candidates for nonattainment status for the fine particle (PM-2.5) air-quality standard. EPA guidance establishes the metropolitan area (i.e. the larger of the Consolidated Metropolitan Statistical Area (CMSA) or Metropolitan Statistical Area (MSA)) as the presumptive boundary for PM-2.5 nonattainment areas (memo from Jeffrey R. Holmstead to EPA Regional Administrators, April 1, 2003). OMB issued revised urban-area definitions on June 6, 2003. Although states were not asked to use the 2003 urban-area definitions when recommending PM-2.5 nonattainment areas to EPA, EPA is using the 2003 definitions in its review of State (and Tribal) recommendations. Therefore, this 9-factor analysis considers all counties in Missouri that are in the 2003 MO-IL St. Louis CMSA, as well as any adjacent counties that are in Missouri. (A list of the 2003 metropolitan area definitions is available at:

<http://www.census.gov/population/www/estimates/metroarea.html>.)

